# Innovative Development of Digital Exhibitions Based on Web3.0 Technology

Beining Zhang[1], Yuxin Zhang[2], Haokai Zhang[3], Hongzhen Ni[4], Ziyu Chai[5], Jiankang Zhang[4], Fang Xie[1,*]

[1]School of Creative Design, Zhejiang Institute of Economics and Trade, Hangzhou, Zhejiang, 310018, China
[2]School of European Languages and Cultures,Zhejiang International Studies University, Hangzhou, Zhejiang. 310023, China
[3]School of International Business,Zhejiang International Studies University, Hangzhou, Zhejiang, 310023, China
[4]School of Culture&Tourism,Zhejiang International Studies University, Hangzhou, Zhejiang 310023, China
[5]Department of Computer and Information Security,Zhejiang Police College,Hangzhou, Zhejiang, 310053, China

*Corresponding author.Email: xf@zjiet.edu.cn

**Abstract.** The decentralized universal digital identity system, information interaction and integration, user data sovereignty, data synchronization, and auditing features of Web3.0 technology hold immense application potential in the digital exhibition industry. Web3.0 technology drives business transformation in the digital exhibition sector, enabling innovations such as decentralized exhibition platforms, exhibition community economies, supply chain financial services, exhibition token economies, and NFT exhibit sales and collections. In the face of challenges during the application of Web3.0 technology, measures should be taken to promote the unification of technical standards and norms, optimize cost structures to reduce application costs, enhance user education to improve social awareness, and refine laws and regulations while strengthening policy research.

**Keywords:** Web3.0 Technology, Digital Exhibitions, Application Potential, Business Transformation, Risk Management.

## 1 Introduction

Digital exhibitions refer to the utilization of digital technologies to transfer traditional offline exhibition activities to online platforms or to integrate both online and offline elements, thereby providing exhibitors and visitors with more convenient, efficient, and enriched exhibition experiences. Web3.0 technology, which operates on a decentralized blockchain-based infrastructure, represents the next generation of the internet. It encompasses various dimensions such as network and computing technologies,


R. Koul et al. (eds.), *Proceedings of the 2nd International Conference on Educational Development and Social Sciences (EDSS 2025)*, Advances in Social Science, Education and Humanities Research 924,
https://doi.org/10.2991/978-2-38476-400-6_33

security and trust technologies, virtual-real integration technologies, and intelligent interaction technologies [1].This technology has the potential to revolutionize the internet from technical, industrial, and economic perspectives. Web3.0 offers novel approaches and possibilities for the development of digital exhibitions, particularly in innovating corporate exhibition service models, enhancing operational efficiency, integrating internal industry resources, optimizing exhibition enterprise structures, and deepening customer service [2].In the era of the digital economy, the feasible path for exhibition enterprises to transform and upgrade is to vigorously promote the development of digital exhibitions. Key areas of focus include constructing robust information platforms to achieve digital management; creating diverse experiential scenarios for immersive marketing; adopting digital marketing methods for precise promotion; and improving foundational support to solidify digital work levels [3].

## 2 Analysis of the Application Potential of Web3.0 Technology in Digital Exhibitions

### 2.1 Analysis of the Application of Decentralized Universal Digital Identity System Characteristics

Web3.0 technology can enhance participants' control over their data, facilitating data assetization. Data control authorization means clearly defining data owners, users, and their respective permissions and responsibilities, ensuring appropriate management and protection of data throughout its lifecycle—from collection and storage to usage and sharing. Traditional informed consent-based personal data autonomy no longer aligns with the technological ecosystem of Web3.0. The participatory, control-based, mutual trust, and sharing logic of Web3.0 can reconstruct the rules governing personal data autonomy [4].

Web3.0 technology improves the security and efficiency of identity verification and establishes trust mechanisms. Decentralized digital identity systems use advanced encryption algorithms to securely store and transmit identity information, offering robust security and tamper-proof features. Combining this with multi-factor authentication (e.g., passwords, biometrics like fingerprints and facial recognition, hardware tokens) enhances security by reducing the risk of single-factor breaches.

Web3.0 promotes cross-platform and cross-exhibition identity interoperability, advancing community governance. The decentralized digital identity system enables identity portability, reducing repetitive registrations and cumbersome verifications. Digital exhibitions can leverage this system to build efficient community governance mechanisms.

### 2.2 Analysis of Information Interaction and Integration Feature Applications

Web3.0 technology integrates information from multiple channels, enabling real-time reception and interaction. By addressing challenges such as fragmented, redundant, and difficult-to-filter information from dispersed sources, Web3.0 can efficiently

consolidate data from social media, official websites, industry forums, and other channels. Exhibition organizers can aggregate and present this information centrally, allowing exhibitors and visitors to access comprehensive and systematic information seamlessly, significantly improving the efficiency of achieving exhibition goals.

Web3.0 supports data analysis and decision-making through intelligent semantic understanding and search capabilities. These functions surpass traditional keyword-based search modes by deeply comprehending the semantics and intent behind natural language text inputs, thus finding more accurate and comprehensive information, enhancing the efficiency and quality of information retrieval, and enabling users to quickly obtain the content they truly need [5].

Web3.0 enables personalized information push notifications, fostering virtual social interaction. By leveraging interest-based connections, Web3.0 can help users discover others with similar interests and relevant events more easily. This stimulates user engagement and creativity, providing more topics and opportunities for interaction, leading to deeper and more meaningful social connections and friendships.

### 2.3 Analysis of Data Synchronization Encryption and Audit Features

Web3.0 technology ensures data synchronization and encryption, supporting supply chain management and traceability. Under secure constraints, embedded synchronization encryption algorithms compute differential data at various hierarchical levels, generating key bit values that provide high security [6]. Smart contracts, a core component of Web3.0, enable digital exhibition organizers to trace and manage the origin, transportation, and storage of exhibits.

Web3.0 technology ensures data integrity verification, enabling transaction record auditing. Data integrity verification aims to ensure that data remains unaltered, undamaged, and intact throughout its lifecycle—from creation and storage to transmission and usage. By verifying data integrity, each transaction record—such as booth bookings, exhibit sales, and advertising placements—can be traced back to its source, forming clear audit trails.

Web3.0 technology implements permission management and access control to ensure security and compliance. Permission management involves planning, allocating, and managing various operational permissions (including read, write, modify, delete, execute) for systems or resources. Access control manages access behaviors through identity verification and permission validation, determining who can access specific resources or systems and under what conditions. This prevents unauthorized access to sensitive information or critical functions, reducing security risks and safeguarding against malicious use or accidental damage, thereby fortifying the system's security framework.

# 3 Business Transformation in Digital Exhibitions Brought by Web3.0 Technology

The digital economy encompasses not only the data industry but also the integration of this industry with economic and social sectors, leading to new products, industries, forms, and models [7]. Web3.0 technology promises significant changes in the structure, processes, services, and organizational frameworks of digital exhibitions.

## 3.1 Decentralized Exhibition Platform

Digital exhibition organizers can leverage the decentralized nature of Web3.0 to create platforms managed collectively by the community. These platforms can enhance data operational capabilities, supporting application innovation and business innovation. The goal is to develop intelligent entities characterized by pervasive sensing, data processing, computation, and connectivity [8]. Decentralization involves distributing power, control, or decision-making from a centralized entity to multiple nodes, reducing dependency on a single center and granting each node a degree of autonomy and participation.

## 3.2 Exhibition Community Economy

The social graph characteristics of Web3.0 offer new opportunities for creating a community economy within digital exhibitions. A social graph visually represents and describes social relationships between individuals, clearly displaying connections and reflecting the density and features of these relationships. Exhibition organizers can use social graphs to uncover potential relationships and opportunities, grouping users with common interests, hobbies, or goals. This fosters interaction, discussion, and engagement among users, expanding social circles and discovering new collaboration possibilities. It also creates highly interactive and cohesive communities, allowing for precise targeting of user groups based on interest and behavior data. This leads to more personalized recommendations, services, and experiences, enabling more accurate and effective marketing activities.

## 3.3 Supply Chain Financial Services

Supply chain finance is a financing model where banks or financial institutions connect core enterprises and their upstream and downstream partners to provide flexible financial products and services. Leveraging the decentralized attributes of Web3.0, digital exhibition organizers can build a supply chain information platform based on Web3.0 technology. By integrating and tokenizing information from exhibitors, suppliers, buyers, and other supply chain participants, this platform provides reliable data sources for financial services. In this new era of smart technology, various Web3.0 systems are emerging and thriving, bringing unprecedented diversity and community-driven transformations that reveal an open future full of infinite possibilities [9].

### 3.4 Exhibition Token Economy

The token economy leverages tokens as key elements to coordinate resources, drive productivity and production relations, harmonize interests, encourage participation, and share benefits. Digital exhibition organizers can issue exclusive tokens for their events within legal frameworks. These tokens can be used for paying entry fees, purchasing exhibits, accessing services, and more. Participants can earn token rewards by engaging in exhibition activities or completing tasks. The circulation of tokens promotes economic cycles within the exhibition, enhancing user engagement and activity levels.

### 3.5 NFT Exhibit Sales and Collecting

Non-Fungible Tokens (NFTs) represent unique digital assets on the blockchain, serving as verifiable ownership certificates for multi-dimensional and complex data objects. Exhibition organizers can legally develop NFTs for exhibitions and related merchandise, collaborating with exhibitors to tokenize unique items for sale. This sales model offers new monetization channels for digital content creators, breaking some traditional barriers in the art market. Buyers acquire proof of ownership through NFT purchases, with transactions traceable on the blockchain, ensuring clear and verifiable ownership records.

## 4 Addressing Challenges in Empowering Digital Exhibitions with Web3.0 Technology

As an emerging technology, Web3.0 presents numerous opportunities for digital exhibition operators but also faces challenges such as technical complexity, lack of unified standards and norms, high costs, and unclear regulatory frameworks. To address these challenges, we propose the following strategies:

### 4.1 Unifying Technical Standards and Norms

Standards are crucial for advancing technology transfer, supporting core technology breakthroughs, securing a competitive edge in the digital economy, and optimizing industrial structures [10]. Unifying technical standards and norms facilitates the widespread adoption of Web3.0 in digital exhibitions. Key actions include strengthening industry collaboration, aligning with international standards, establishing testing and certification systems, and fostering talent development in technology research.

### 4.2 Optimizing Cost Structures and Reducing Application Costs

Reducing the cost of applying Web3.0 technology is essential for its widespread adoption in digital exhibitions. Hardware-wise, selecting and configuring server hardware based on actual needs can improve performance without excessive redun-

dancy. Software-wise, efforts should focus on reducing energy consumption and developing efficient architectures. Organizers should devise cost-effective integration plans tailored to real-world requirements, avoiding unnecessary pursuit of cutting-edge technologies.

### 4.3 Enhancing Legal Frameworks and Policy Research

Robust legal frameworks are vital for the healthy development of Web3.0 applications in digital exhibitions. Governments must accelerate legislative processes, while enterprises should actively engage in policy research to ensure compliance with relevant laws and regulations. Establishing comprehensive regulatory mechanisms and strengthening enforcement will safeguard the digital exhibition market. Additionally, setting up dispute resolution mechanisms, such as arbitration bodies and mediation committees, can provide efficient and convenient solutions to conflicts arising in digital exhibitions.

## 5 Conclusion

Digital exhibitions represent a critical component of the digital transformation of the traditional exhibition industry. Web3.0 technology, with its decentralized, intelligent, and secure characteristics, offers unprecedented opportunities and transformative changes for digital exhibitions. However, the application of Web3.0 technology is not without challenges, including technical complexity, high costs, and regulatory uncertainties. We have proposed strategies to unify technical standards, optimize cost structures, and enhance legal frameworks to address these challenges. Looking ahead, Web3.0 technology will significantly empower the digital exhibition industry, making it smarter, more efficient, transparent, and user-friendly. Embracing Web3.0 technology is not only crucial for enhancing corporate competitiveness but also an essential path for the overall transformation and upgrading of the digital exhibition sector.

## References

1. Xu Lei, Li Sha, Ning Huansheng. Concept, Connotation, Technology, and Development Status of Web 3.0. Journal of Engineering Science, 05, pp.774-786(2022).
2. Zhang Jing. Empowering the Transformation and Development of Exhibition Enterprises with Digital Economy: Motivation, Mechanism, and Path. Exhibition Economy, 16, pp.14-17(2023).
3. Zhang Lingshao, Shi Yalin. Research on Service Marketing Strategies for Exhibition Enterprises in the Digital Economy Era. Exhibition Economy, 12, pp.8-11(2024).
4. Lai Xiaopeng, Guo Ziheng. Reconstructing Personal Financial Data 'Self-Determination' Rules in the Web 3.0 Era. Journal of Northwest University (Philosophy and Social Sciences Edition), 09, pp.78-90(2023).
5. Luo Qinyu, Wang Yu, Wang Hui, Wang Sizhe. Analysis and Practice of a Simplified Intelligent Search Optimization Model Based on Semantic Understanding. Artificial Intelligence, 04, pp.61-70(2023).

6. Jiang Mingdong. Hierarchical Transmission and Synchronous Encryption Algorithm for Embedded Terminal Data under Security Constraints. Journal of Hubei Polytechnic University, 39(2), pp.25-29(2023).
7. Yu Zhang.Balance Analysis of Digital Industry Development Based on Web3.0. Proceedings of 3rd International Conference on Economic Development and Innovation 11,pp.363-368(2022).
8. Lei Xianfeng. Application of Digital Platforms and Integrated Architecture in Smart and Intelligent Exhibitions: A Case Study of the Xiamen International Convention Center. Green Construction and Intelligent Buildings, 12, pp.146-152(2023).
9. Juanjuan Li,Fei-Yue Wang.The TAO of Blockchain Intelligence for Intelligent Web 3.0.IEEE/CAA Journal of Automatica Sinica10(12),pp.2183-2186(2023).
10. Lian Guiqing. Accelerating the Construction of a High-Quality Digital Technology Standards System to Promote Steady and Sustainable Digital Economic Development. China Academy of Electronics and Information Technology Standardization, 21, pp.52-55(2022).